QUESTIONS & ANSWERS ABOUT SATELLITE EARTH STATIONS

from

SPACE

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Questions and Answers About Satellite Earth Stations

Prepared by

SPACE

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SPACE is working to make the benefits of earth station technology available to all Americans. Composed of manufacturers, distributors, dealers, private cable operators and consumers, SPACE represents the industry before Congress, the FCC, the Executive Branch and the public. The trade association's principal goal is to obtain equitable treatment of the earth station industry and its consumers in the video marketplace.

Since its inception, the earth station industry has had an uphill struggle. But, because of the dedication of many industry figures and because of the work of SPACE, the industry has survived and indeed is flourishing! Join us now as the earth station industry enters an era of increased recognition and opportunity. Be a part of SPACE as the earth station industry comes of age.

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(Membership application is included.)

Contents

1. BACKGROUND ON COMMUNICATIONS SATELLITES 1

2. THE EARTH STATION INDUSTRY AND EARTH STATION OPERATIONS 8

3. PRIVATE CABLE SYSTEMS (SMATV) 16

4. DIRECT BROADCAST SATELLITES 19

5. BECOMING AN EARTH STATION DEALER 20

6. LEGALITIES 21

7. ABOUT SPACE 24

1 Background on Communications Satellites

Q. What is the history of communications satellites?

A. The Soviets won the first round of the satellite race when SPUTNIK was launched in 1957. However, not far behind was the United States' 1958 launch of EXPLORER 1. 1958 also saw the launching of the U.S.'s first communication satellite, SCORE, which transmitted to earth President Eisenhower's Christmas message.

During the 1960s, manned space flights were the focus of the United States' military effort with the Mercury, Gemini, and Apollo programs leading the way. The Soviet Union was also focusing much of its effort on manned space flight.

Though the manned space flights were receiving all the attention, unmanned satellite programs were being developed as well. In 1960, ECHO was launched. This primitive satellite was actually a plastic balloon over 100 feet in diameter which was coverd with a metal surface to reflect back to earth signals transmitted to it from a ground station. Cross-country transmissions were accomplished with ECHO, as well as the transmission of signals between the U.S. and Europe. During the same year, COURIER, the first "active" satellite was launched. ECHO was merely a passive repeater of satellite signals—the signals were simply bounced back to earth off of ECHO's surface. But COURIER was equipped to receive, store, retransmit and boost the power of the signals transmitted to it from earth.

In 1962, AT&T launched the first commercial communications satellite, TELSTAR I. It had the capacity to transmit 600 telephone calls simultaneously or one television picture—and, it, in fact, transmitted live television pictures from Great Britian to the U.S. However, the satellite was not launched into a geosynchronous orbit, but rather followed an eliptical orbit. It circled the earth at a very low altitude and was in the proper position to transmit television signals only for a few minutes at a time!

RCA followed closely behind AT&T with project RELAY, developed under contract to NASA. More sophisticated and powerful than TELSTAR, RELAY is best remembered for transmitting to the U.S. live telecasts of a parade in Moscow's Red Square. RELAY also provided the first satellite telephone calls between Germany and the U.S.

During this era, satellite communications was greatly hampered by the eliptical orbit. Trans-Atlantic satellite communication could only occur when the satellite was in the proper phase of its eliptical orbit.

This problem was solved in 1963 when SYNCOM was launched into a geostationary orbit. This is a high altitude orbit (22,300 miles) above the equator where the satellite revolves around the earth once every 24 hours. Because the satellite revolves around the earth at the same speed that the earth rotates on its axis, the satellite appears to be standing still, i.e., stationary above the equator. The gyosynchronous orbit was first proposed by science fiction writer, Arthur C. Clarke, in a 1945 article he wrote for Wireless Magazine.

During 1962, Congress passed the Communications Satellite Act. The Act established COMSAT, a "quasi public" corporation to create a global satellite communications system. This was the first big step in the commercial era of satellite communications. In 1964, INTELSAT was formed by the United States and a number of foreign nations to own and operate international satellites. Each member country has a representative to INTELSAT, the U.S. being represented by COMSAT. INTELSAT currently operates over 12 satellites serving the worldwide communications needs of its member countries. The INTELSAT satellites (as well as all other currently functioning communications satellites) operate in a geosynchronous orbit. In 1965, INTELSAT launched the EARLY BIRD. It transmitted international television signals as well as telephone calls. In 1969, INTELSATs II and III were launched and the EARLY BIRD was decommissioned.

In 1972, Canada entered the satellite era with the launch of ANIK I, (built by RCA) the world's first geostationary satellite scheduled to handle only domestic communications. ANIK II was launched in 1973.

In 1972, the FCC authorized U.S. companies to launch and operate domestic communications satellites. Western Union and RCA launched modern communications satellites in 1974 and 1975. (See Figure 1). Respectively christened WESTAR and SATCOM, these satellites were launched to meet the video, audio and data communication needs of domestic companies. Western Union and RCA saw satellite communications as an alternative to the expensive and frequency unsatisfactory common carrier communications facilities provided by terrestrial landline and microwave networks. During the 1970s, the major U.S. telephone companies began using satellite facilities to route domestic phone calls, by leasing the COMSTAR satellite from COMSAT. Other large users of communications common carrier facilities also saw satellites as a source of less expensive and high reliability communications.

The early RCA satellites employed a special feature called cross-polarization, which gave them an advantage over the early WESTAR satellites. Cross-polarization allows for 24 transponders—(12 horizontal and 12 vertical) or channels—per satellite as opposed to WESTAR's 12 transponders per satellite. Each transponder can generally transmit one channel of television programming, therefore, increased capacity was achieved by RCA through use of cross-polarization techniques.

In 1975, Home Box Office (HBO) became the first pay television service to transmit its programming via satellite by utilizing the SATCOM bird. By utilizing a satellite distribution system, HBO was able to transmit its programming simultaneously to all of its cable television affiliates. Previously, these cable systems employed "stand alone" systems—each system obtained a videotape of the HBO programming and transmitted it to its subscribers. The advent of communications satellites permitted a much more efficient system whereby all cable systems receive the HBO satellite feed at the same time. In 1976, Southern Satellites, a common carrier, followed HBO and began distributing the WTBS television signal via SATCOM. By choosing the same satellite as HBO, Southern Satellites ensured that any cable system equipped to pick up HBO could pick up the WTBS programming, as well.

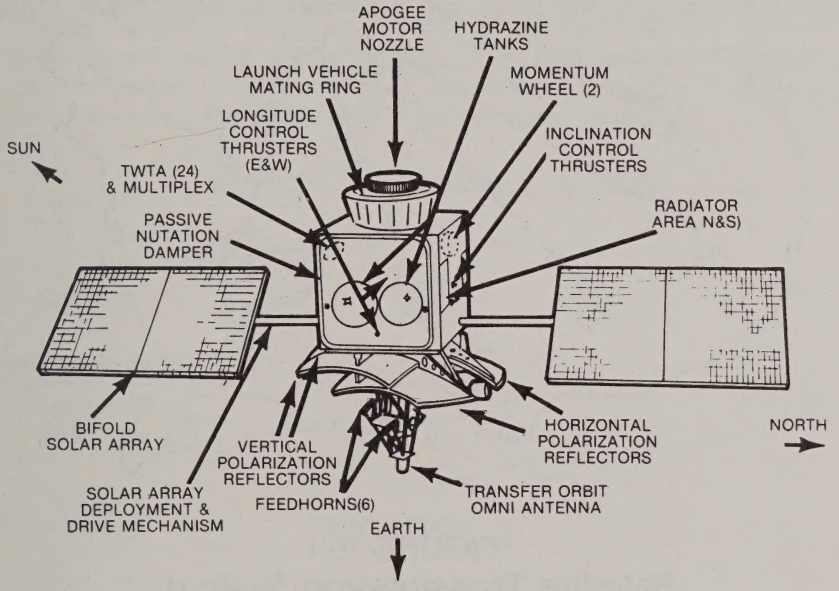


FIGURE 1
Components of RCA Satcom Satellite

Other pay television services soon followed HBO into the satellite distribution of programming, and in addition to WTBS, the television station in Atlanta, Georgia, WOR-TV, New York and WGN in Chicago are currently transmitted via satellite. Today, virtually all nationally distributed cable television programming is delivered via satellites.

Domestic communications satellites are currently used to carry a variety of video, voice and data communications. Satellites have proven to be a reliable and efficient method for distributing a wide variety of communications information to a large number of people simultaneously. It is likely that satellites will play an ever increasing role in both the domestic and international communications industry.

Q. How does the satellite program distribution system work?

A. The programmer designates an uplink facility somewhere in the United States. From this point the programming is transmitted to a satellite orbiting approximately 22,300 miles above the earth. The satellite reflects the transmitted signal down to earth in such a way that it is receivable in the entire continental U.S. In this manner, the programmer can blanket the United States with its programming signal. (See Figure 2).

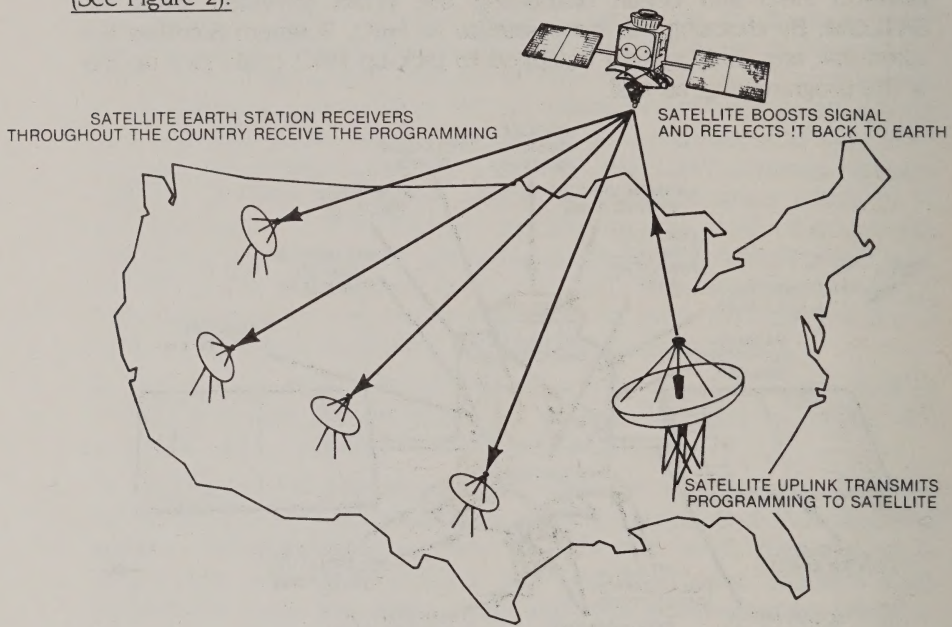

SATELLITE EARTH STATION RECEIVERS
THROUGHOUT THE COUNTRY RECEIVE THE PROGRAMMING
SATELLITE BOOSTS SIGNAL
AND REFLECTS IT BACK TO EARTH
SATELLITE UPLINK TRANSMITS
PROGRAMMING TO SATELLITE

FIGURE 2
Satellite Transmission System

Q. What advantages do satellites have over other transmission methods?

A. Most land-based (terrestrial) distribution systems charge a fee for the transmission of signals that is largely based on the distance that the communication is sent—the greater the distance (and the more plant and equipment necessary), the greater the charge—very much like long distance rates for telephone service. Satellite transmissions are insensitive to distance. It costs no more to send communications via satellite from Kansas City to St. Louis than it costs to go from Kansas City to California. For this reason and others, more and more program producers and data service providers are choosing to distribute their product by satellite. Also, there can be many low cost reception points in a satellite based system and that makes final delivery to the customer less expensive than terrestrial distribution.

Q. Who owns the satellites?

A. The major communications satellites are owned by several large communications companies including: AT&T (its satellites are usually utilized for telephone communications), Western Union (WESTAR), RCA (SATCOM), Hughes (GALAXY), and the Communications Satellite Corporation (COMSTAR). Figure 3 shows the various satellites and their orbital locations. These corporations lease transponders or channels on the various satellites to programmers (and others) who wish to distribute their programming via the satellite system. One of the RCA satellites, SATCOM III, is commonly referred to as the cable bird. This is the satellite which carries WTBS, WGN, ESPN, C-SPAN, HBO, and a number of other programming services. In the recent past there was still competition for the transponder space on SATCOM III and other satellites. However, some people believe that in the near future there will be a transponder glut. A number of companies have gotten into the satellite business and have launched, or intend to launch, communication satellites.

World TV Satellite Locations

FIGURE 3

Q. On what frequencies do the satellites transmit; can I pick them up on my television set?

A. The programming transmitted via these satellite systems utilizes frequencies in the 3.6 to 4.2 GHz range. These frequencies are not receivable on a conventional television set which picks up frequencies in the 70 MHz to 500 MHz range. Therefore, special equipment is necessary to receive these satellite signals.

Q. How many channels of programming are transmitted via satellite?

A. At the present time, there are approximately 12 major commercial North American satellites in orbit. The satellites have up to 24 transponders (channels) each. Many of the transponders, however, are not serviceable; are not in use 24 hours a day; or, are used to provide data or other services which cannot be received in intelligent form by home earth stations. Earth stations can be purchased which may be easily rotated to receive signals from all satellites in order to "cherry pick" the best of the programming.

Q. What kinds of information and entertainment programming are transmitted by satellite?

A. There are multiple sources of programming on North America's existing satellites. There are channels devoted to news, sports, first-run movies, religious services, educational services and financial information. In addition, several broadcast television channels such as WOR in New York, WGN in Chicago and WTBS in Atlanta, are transmitted via satellite and can be received by home satellite earth station receivers. Often the television networks use satellite transmission as a means to provide distribution of their newscasts to their affiliate stations. Figure 4 shows the programming currently carried by the domestic satellites.

Q. In addition to domestic satellites, I've heard that satellite earth stations can receive some international satellite communications. What is this all about?

A. Depending upon your location and whether your antenna is fixed or movable, there are various international satellites which can be viewed by private satellite receive systems. These include the following:

14° West—GHORIZONT (Russian)—typically video programming, week days, until 3:00 p.m. (Eastern Time,) then test patterns, followed by 6:00-7:00 p.m. video feeds to Cuba.

18.5° West—INTELSAT—Very limited video on this satellite.

21.5° West—INTELSAT—Strong video signals on U.S. dial positions 1 and 5.

24.5° West—INTELSAT—There is limited video on this satellite.

27.5° West—INTELSAT—After 5:00 p.m. (Eastern Time) there is considerable video on this satellite from Peru, Columbia, Venezuela and Argentina.

34.5° West—INTELSAT—Some U.S. or European video news feeds.

53° West—INTELSAT—Moderate level TV signals on transponders 1, 5, 7 and 8. The first three are from Mexico and the fourth is from San Diego with a mixture of U.S. programming. This satellite is visible to most of the U.S. except for the far Northwest.

FIGURE 4
Lisit of Programming Currently Transmitted Via Satellite

Satcom FIII (Main Services)

TRANSPONDER NUMBER	SERVICE
1	Nickelodeon
1	ARTS
2	PTL
3	WGN
4	Spotlight
5	The Movie Channel
6	WTBS
7	ESPN
8	CBN Cable Network, The Family Entertainer
9	USA Cable Network
10	Showtime (West)
11	MTV
12	Showtime (East)
13	HBO (West)
14	CNN (Cable News Network)
15	CNN Headline News
16	HTN Plus
16	ACSN-The Learning Channel
16	NJT (National Jewish Television
17	Cable Health Network
18	The Alternate View Network
18	EWTN (Eternal Word Television Network)
18	Reuters Monitor Service
19	C-SPAN
20	Cinemax (East)
21	The Weather Channel
22	MSN (Modern Satellite Network)
22	Daytime
22	USA Blackout Network
22	HBO
23	Cinemax (West)
24	HBO (East)

Satcom FIII (Subcarrier Auxiliary Services)

TRANSPONDER NUMBER	SERVICE
2	Satellite Radio Network
3	Bonneville Easy Listening Music
3	Country Coast-to-Coast
3	Electronic Program Guide
3	Moody Broadcasting Network
3	Seeburg/Lifestyle Music
3	Stardust
3	StarStation
3	WFMT-Chicago
6	Music in the Air
6	North American Newstime
7	ESPN Affiliate Informational Network
14	CNN Radio Network
16	HTN Plus

Satcom FIV (Main Services)

TRANSPONDER NUMBER	SERVICE
1	SIN (National Spanish Television Network)
2	Financial News Network
3	SPN (Satellite Program Network)
6	Bravo
7	The Playboy Channel
7	NCN (National Christian Network)
8	The Entertainment Channel
15	BizNet, The American Business Network
17	TBN (Trinity Broadcasting Network
19	The American Network
23	GalaVision

Satcom FIV (Subcarrier Auxiliary Services)

TRANSPONDER NUMBER	SERVICE
3	Nationality Broadcasting Network
6	Bravo
7	Family Radio Network (E)
7	Family Radio Network (W)

Westar IV (Main Services)

TRANSPONDER NUMBER	SERVICE
9	Blue MAX Theater
18	SelecTV
19	Eros

Westar V (Main Services)

TRANSPONDER NUMBER	SERVICE
3	WOR-TV
4	UTV Cable Network
8 11 14 16 18	Satellite News Channel
17	Nashville Network
24	BET (Black Entertainment Television)

2 The Earth Station Industry and Earth Station Operation

Q. Now that I know something about transmitting programming via satellite, how does the home earth station industry fit into this?

A. The home earth station industry is an important segment of the satellite programming distribution system. The earth station industry manufactures the equipment that is used to receive the satellite signals. As we mentioned previously, the satellite transmitted signal is not receivable over a conventional television set because of the transmit frequencies used. The special equipment that is used to receive the satellite transmitted programming is called an earth station or a TVRO (which stands for a television receive only station). The earth stations themselves are frequently referred to as dishes. The earth station industry consists of the manufacturers, dealers and distributors of the earth station equipment, and their customers, those who utilize earth station facilities.

Q. Exactly how does a satellite earth station system work?

A. Figure 5 is a simple diagram of the earth station receiving equipment. The earth station system consists of three basic components: the antenna (or dish), the low noise amplifier (LNA), and the receiver.

FIGURE 5
Satellite Reception System

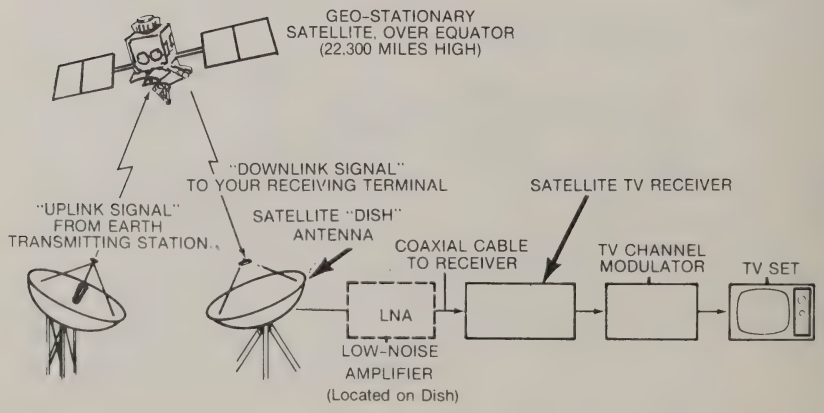
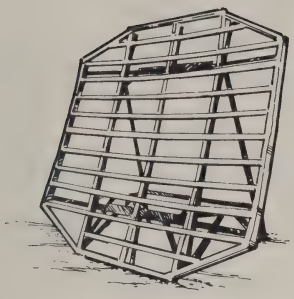


FIGURE 6



Spherical Antenna

Parabolic Antenna

The Antenna

The most recognizable component of the earth station system is the antenna or dish. With a surface usually 8 to 15 feet in diameter, it receives the satellite signal. The typical dish comes in two basic shapes: parabolic and spherical. The parabolic antenna is basically a radio reflective shallow dish. It is generally constructed of spun aluminum or fiberglass laid over metal or wire mesh, or consists entirely of wire mesh. The spherical antenna is a more square shape and is usually constructed out of wire mesh. (See Figure 6). The antenna captures the satellite signal and reflects it to the focal point of the antenna where the feedhorn is located.

The Feedhorn

The feedhorn is a type of metallic signal collector that carries the satellite microwave signal into the next component, the low-noise amplifier (LNA). The feedhorn is a very important part of the satellite earth station system because it is responsible for capturing the signal reflected from the dish and directing it into the LNA. There are two popular types of feeds, the Prime Focus feed and the Cassegrain feed. Figure 7 gives examples of both. Figure 8 depicts a typical feedhorn.

The LNA (Low Noise Amplifier)

The LNA is located at the focal point of the antenna. It receives the signals from the feedhorn and amplifies them. It must be remembered that the satellite signal is transmitted at a very low output power (5 watts). Therefore, it must go through amplification in order to be received over the conventional television set.

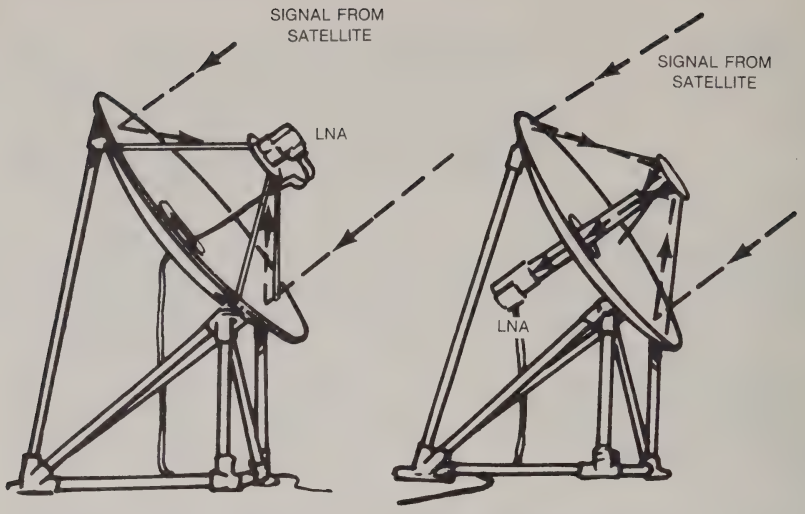


FIGURE 7

Because the satellite signal is so weak, the natural noise produced from the earth's radiation of heat energy can cause interference to the reception of satellite signals. Therefore, a measurement (degrees Kelvin) is used to measure the amount of noise the LNA generates in a normal environment compared to the LNA's generation of noise at zero degrees Kelvin. The lower the degrees the better or more sensitive the low noise amplifier. (See Figure 9).

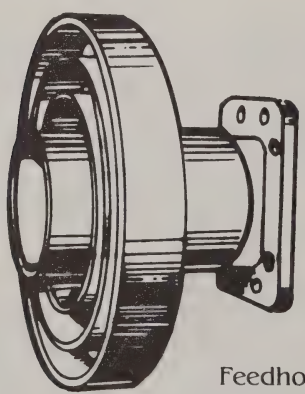


FIGURE 8

Feedhorns come in various shapes (square, rectangular or round.) A round feedhorn is pictured here.

As noted before, satellites generally contain 24 transponders. Twelve of these transmit on vertical polarization and 12 on horizontal polarization. To switch from the vertical to the horizontal transponders of the satellite, the LNA must be turned 90° or must be fitted with a feedhorn that performs the rotation internally. Alternatively, two or dual LNAs can be used instead of a rotator. However, this is usually an expensive alternative.

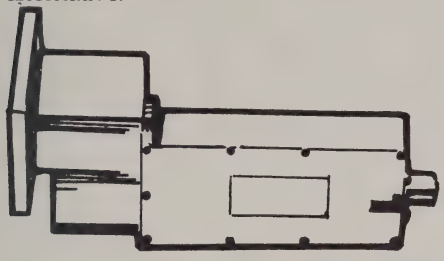


FIGURE 9

A Low-Noise Amplifier is pictured here. It is located at the focal point of the antenna.

Down Converter

The amplified signal from the LNA is next fed through special coaxial cable into a down converter. The coaxial cable is usually rather large in diameter and specially manufactured to prevent the loss of the satellite signal. The down converter changes the microwave frequency received from the satellite into an intermediate frequency (IF). The down converter is usually mounted on the antenna. Another variation of the LNA and down converter components is a LNC (low noise converter). These devices have the down converter built right into them and thus eliminate the need for a separate down converter.

The Receiver

The receiver is the third major component of the satellite earth station system. The receiver tunes in the various satellite transponders. A knob located on the receiver allows you to change transponders much the same way the channel selector on a television set allows you to change channels. Another function of the receiver is to take the down-converted IF signal and convert it into the standard baseband 70 Mhz video/audio frequency. The receiver itself does not have any built in audio or visual display system. There are output jacks located on the rear of the receiver. These output jacks carry the standard baseband audio/video signal. (See Figure 10). The signal is very similar to the signal which is produced from a standard television camera. However, this signal is not viewable on a standard TV set. An additional piece of equipment is necessary to convert the signal to a TV channel.

The Modulator

The modulator takes the signal from the receiver and converts it into a channel on a standard TV set (usually channel 3 or 4). Most electronic devices that you hook up to your television to use the TV screen as a viewing screen (such as video games) contain modulators. All video cassette recorders (VCRs) have a built-in modulator. Therefore, if you have a VCR you can feed the audio and video outputs from the receiver directly into the VCR and altogether eliminate the need for a separate modulator. Some satellite receivers have built-in modulators.

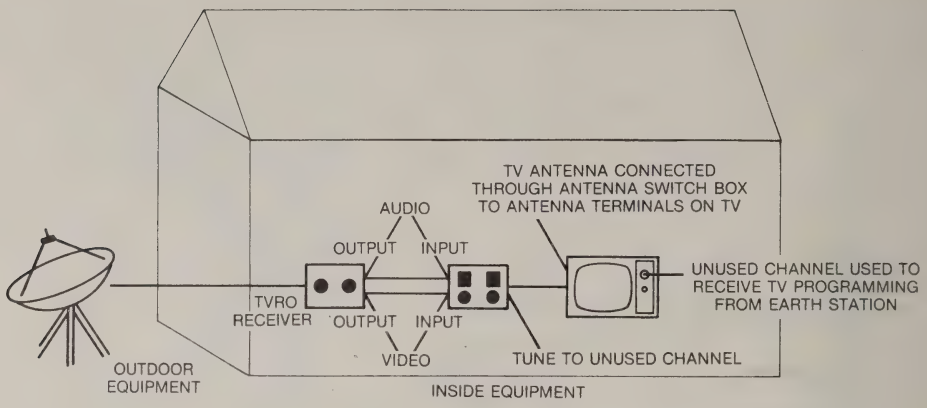


FIGURE 10

Q. **Is there any additional equipment that I need to operate my home earth station system?**

A. The basic system components listed above are the: antenna (dish); feedhorn; LNA; receiver, and modulator. However, there are a number of special features and ancillary equipment currently available from a variety of manufacturers. Some of these include:

Actuators (Satellite Locators)
Standard satellite installations include a mount which permits the manual rotation of the antenna to receive the various satellites. To avoid going out of doors, however, this function can be performed electronically with a device called an actuator. The actuator engages a motor drive on the dish which turns the dish until the desired satellite is received. Sophisticated versions are available which permit the preprogramming of satellite locations so that you need only push a button to change satellites.

LNA Rotator
Many satellites transmit on 24 transponders (or channels), 12 of them vertically polarized (vertical transmission waves) and 12 of them horizontally polarized (horizontal transmission waves). In order to receive both the vertically and the horizontally polarized channels, the LNA must be rotated 90° to the vertical or horizontal position. This rotation can be done automatically with an LNA rotator. A feedhorn, which performs the rotation internally, is also available.

Mounts
There are a variety of mounts for parabolic home earth station dishes, the three most popular being the AZ/EL, the polar mount and the fixed mount. The type of mount used is important because it determines the type and extent of adjustment necessary to aim the dish at the various satellites. All mounts have their advantages and disadvantages. Discussing the various mounting systems with your earth station dealer will ensure that the correct mount is chosen for your installation. But, be sure

to keep one factor in mind no matter what type of mount is chosen: wind loading. Mounting structures must be strong enough to ensure that the dish, which picks up considerable weight in a heavy wind, can withstand storms and any other weather conditions likely to prevail in your area.

Q. If I have an earth station, do I need to subscribe to cable television?

A. Much cable television programming is received from satellite feeds. Earth stations can receive all of the same satellites that cable television systems do. You may wish to subscribe to cable television to obtain local television stations, some distant stations of regional interest, locally-produced programming or two-way services (such as burglar alarm services) now being made available by some cable systems.

Q. Can I hook up a VCR to my earth station?

A. Yes. If a VCR is used, the audio and video earth station receiver outputs are plugged into the VCR audio and visual inputs.

Q. If I have cable TV, MDS or subscription TV attached to my TV set, can I have an earth station as well?

A. Yes.

Q. Can I still receive local over-the-air television signals if I hook up an earth station to my television?

A. Yes. The reception of local signals of-the-air is not altered when an earth station is used.

Q. What happens if I experience interference on my satellite receiver from other communications sources?

A. This does not happen very often. When it does, terrestrial microwave interference can be prevented by properly placing and shielding the satellite receiver. If you are located in an urban area or in an area where there are many microwave signals, it may be possible to license your satellite earth station, depending on its size, with the Federal Communications Commission. SPACE has provided an easy "how to" procedure in past issues of its monthly magazine. By licensing your receiver, you gain a significant measure of protection against future microwave interference. The location of your receiver is contained in a computer file. Future microwave users must coordinate their frequencies so as not to interfere with your receiver.

Q. What is the smallest sized earth station dish I can use?

A. Currently, anything under 10 feet will not generally produce an acceptable picture in most of the United States, although experimentation with smaller dishes is now on-going. In some areas of the country 12 or 15 foot diameter dishes may be required.

Q. Will trees interfere with earth station reception?

A. Generally, yes. A clear line of sight between the antenna and the Southwestern sky will produce the best results.

Q. Can I mount the dish on my roof?

A. Yes. Rooftop installation is done. But, for safety and convenience, ground mounts are usually recommended.

Q. How much space is required for an earth station installation?

A. Usually allow for a 12′ × 12′ section of ground for the installation.

Q. Will the earth station attract lightening?

A. Yes. But an adequately grounded earth station should pose no safety hazards.

Q. Once installed, can the system be moved?

A. Yes. If you are relocating, the earth station can be disassembled, shipped and installed at your new home.

Q. Do the antennas cause any harmful radiation?

A. No. These installations are designed to receive signals and do not have any more radiation than a TV receiver.

Q. How close should the earth station be to the TV set?

A. Within 100 feet will yield the best results. However, accommodations can be made to overcome most problems where installation sites are limited.

Q. Can a home satellite earth station receiver be bought for $100 or $250?

A. No. These are not home satellite earth stations. In some areas, subscription services are transmitted throughout a community by a service called "Multipoint Distribution Service" or MDS. This is a low power microwave transmission service. The local operator for this service installs the receiving antenna and downconverter on each subscriber's home and charges a monthly fee for the equipment and service.

Q. How much does an earth station cost?

A. There is a tremendous variety in the price of earth stations. The dealer will be able to offer advice on the components which best suit your needs and pocketbook. Medium-priced systems are usually available in the $2,500-5,000 range. But, be sure to shop around. Pick up some magazines and newspapers covering the earth station industry and look at the advertisements. SPACE publishes a monthly magazine, SATVISION, which contains many such ads. Talk to dealers in your area and call manufacturers to get literature about their systems.

Q. I would like to connect my neighbor to my satellite receiver. May I do this?

A. This is a very difficult question to answer. There are several issues of potential legal risk that should be considered. First, if in the process of connecting your neighbor you cross a city street, it may be necessary to obtain an easement or other permission from the city. The city may not grant it; or it may attempt to define you as a "cable television system." You could be subject to multiple headaches as a result of such a designation, including payment of fees to the city. Also, home satellite earth station owners who view satellite communications in the privacy of their homes do not, in SPACE's opinion, violate the copyright law. If you join several homes together to view the satellite service, however, it could be found that you are violating the copyright law unless you obtain viewing permission from those who hold the copyright to the programming in question. Before these activities are undertaken, you should consult your attorney and SPACE, if you are a member.

3 Private Cable (SMATV) Systems

Q. If I live in an apartment house/condominium/trailer park and the cable television company in my area has not provided service, is there any other way to get satellite programming?

A. Yes. In the last year and a half, one of the fastest growing areas of satellite communications has been in the "private cable television" or "satellite master antenna television" area. Private cable operators typically contract with the owner of a multi-unit dwelling or trailer park and install a satellite earth station to provide the same satellite services that are available on traditional cable television. Figure 11 diagrams a typical multi-unit installation.

An extra measure of caution should be taken here. Some of the suppliers of satellite subscription services refuse to authorize reception of their programming by private cable operators. Be sure to contact program suppliers before commencing service. While no court has made a final determination on this issue, it is possible that a court could find that a private cable operator retransmitting signals to members of the public without the authority of the satellite services, particularly a pay TV service, violated the copyright law and other provisions of law.

Q. What exactly is involved in operating a private cable system?

A. Many people believe that operating a private cable system offers a very good business opportunity. To become a private cable operator, you should make a sound business analysis of your prospective customers. Capital is required to enter the business and operate the system. In order to assist individuals thinking about entering the private cable business, SPACE has prepared an informative book, entitled The Business of Private Cable. It contains all of the pertinent information required by potential private cable operators. Details for ordering the book are available in the back of this booklet.

Q. I have heard that if a private cable television operator files with the Copyright Office, he can carry any of the satellite services. Is this correct?

A. By filing with the Copyright Office as a private cable television system, the filer obtains a compulsory license only for the retransmission of those satellite services which are broadcast signals. At the present time, these services are WGN, WOR and WTBS. Filing with the Copyright Office does not result in permission to carry any of the other satellite services.

Q. Is it okay for a nightclub, bar, condominium or apartment house to pick up any pay service such as movie satellite services so long as a direct charge is not made for watching the signals?

A. Probably not. Again, no court has made a final determination on this issue. However, the Copyright Act protects the right of the copyright holder to "publicly perform" various works. The question of payment does not appear to be relevant to whether a given motion picture or other satellite service was "publicly performed." A nightclub or other public establishment which picks up the satellite signals without permission of the satellite service may be liable for copyright infringement.

Q. I have heard that if any of the satellite services refuse to authorize reception by my private cable television system all I have to do is make payment to those services in "escrow". Does an escrow payment guarantee that I will not be sued?

A. Making payment to an escrow account for a satellite service which has refused them viewing authorization does not guarantee that the satellite service will not bring an action against your private television system. The making of such payment may, however, mitigate any damages involved and may be evidence of lack of criminal intent.

Q. Which satellite services deal and which satellite services refuse to deal with private cable television operators?

A. The answer to this question varies constantly as companies change their policies. For an up-to-the-minute answer, we suggest that you join the Private Cable Television Section of SPACE so that you will receive timely information on the satellite services' policies with respect to private cable television systems.

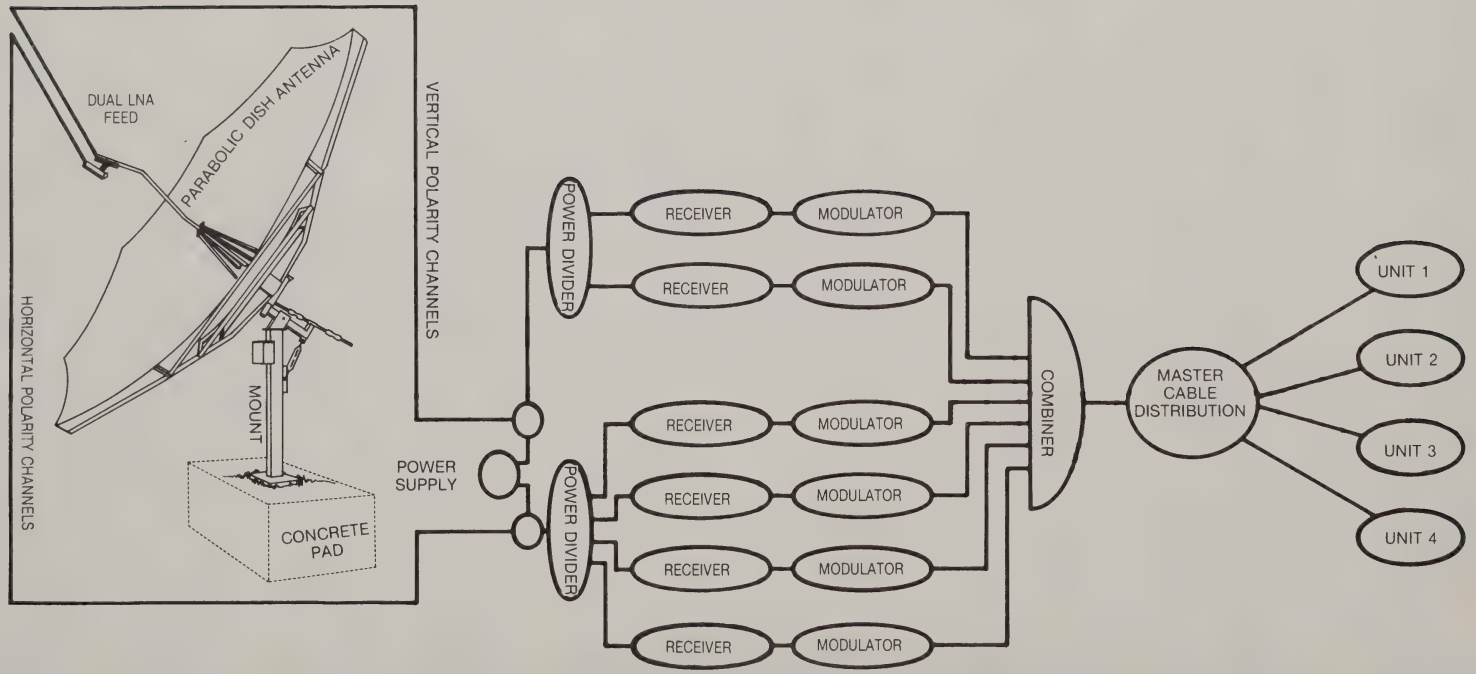


FIGURE 11

Multi-Unit Dwelling

Six Channel Dual Polarity System

4 Direct Broadcast Satellites (DBS)

Q. What are direct broadcast satellites and will DBS make my dish obsolete?

A. No, DBS will not make your dish obsolete. At the present time, the FCC has given its go-ahead to a new service called DBS. It has authorized different satellite ventures in the DBS service which was designed to operate at much higher frequencies (12 GHz), and provide satellite programming directly to homes. Most companies are planning to provide a two or three channel satellite service directly to the home utilizing a dish of between two and three feet in diameter.

However, there are several significant hurdles that must be overcome before these services go into existence. They must be given the final go-ahead from the FCC, as well as cleared through an international administrative radio conference occuring next year. Additionally, the source of programming for the DBS services is as yet unkown. Existing services transmitted via satellite are committed to use of the current satellite system for quite some time. The DBS services are scheduled to become operational in 1986. Rather than rendering existing satellite transmissions obsolete, they will more likely supplement them. It is also possible that existing receivers may be modified to receive some of the future DBS services.

5 Becoming an Earth Station Dealer

Q. How can I become a home satellite earth station dealer?

A. A good first step is to make contact with some of the major earth station suppliers. Contact the manufacturers and find out what their terms are to become a representative for their line of equipment. There are also major distributors of equipment throughout the country. SPACE's monthly magazine, SATVISION, contains the names of major earth station manufacturers, distributors and dealers. It is a good place to start researching companies. Any one of the companies would be glad to give you information on joining them. Seek out some earth station dealers in your area. Find out how they got started in the business. If you are involved in retailing any type of video or electronic consumer products, becoming an earth station dealer as well, may be a natural extension of your existing business. Before you decide to enter the business, you should have a thorough understanding of the earth station system, a good working relationship with your local bank and a marketing strategy. So, do your homework and shop around—find products that you yourself have confidence in and that will satisfy your customers.

Q. How many earth station satellite systems are in use today in the United States?

A. SPACE estimates, that as of March 1, 1983, there were in excess of 100,000 earth station satellite systems serving private homes, in addition to those servicing residents of apartment houses, condominiums and trailer parks. The number of earth stations being shipped to the marketplace has grown geometrically since the FCC deregulated this area in the late 1970s.

6 Legalities

Q. Is a private earth station legal?

A. Yes. There is no law stating that satellite earth station receivers are illegal. There is also no law that says that satellite earth station systems cannot be marketed or sold.

Several years ago, the FCC deregulated satellite earth station systems which means that an individual no longer needs a license to own one. Many services available on the satellite welcome viewing by private satellite dish owners; others do not.

In the FCC's view, the earth station is not illegal—it's what you watch with it that could cause problems. The FCC has said that Section 605 of the Communications Act of 1934 protects existing satellite communications from "unauthorized" reception and use. Neither the FCC nor any court has applied Section 605 to home earth station reception. When, this statement, was made in 1978, it was not made in the context of private home earth stations. Recently, the FCC General Counsel has testified before Congress on this issue and has suggested various amendments to the law to make it absolutely clear that non-commercial reception of satellite programming does not violate the law. Also, the FCC now type accepts or certifies certain types of satellite receivers, depending upon the technical configuration of the receiver. It does not type accept or otherwise certify the antenna (dish).

The FCC, itself, has never taken a formal position on private satellite ownership. It has deregulated satellite earth station ownership, removing its prior requirement that all earth station owners had to be licensed. A license is no longer necessary. Finally, only some of the services, e.g., pay movie services, do not welcome your viewing. This alone, however, does not make it illegal.

Q. Has any city council adopted a law against the installation of satellite earth stations?

A. A number of cities are looking at this area in an attempt to adopt zoning standards governing satellite earth station receivers. In the event that a law is adopted which outlaws dishes entirely, we think that it would be subject to substantial challenge on constitutional, as well as other grounds. On the other hand, if the law contains reasonable setback and height restrictions, in all likelihood, it would be upheld by a court reviewing these matters. SPACE has published a comprehensive manual on zoning issues. Details on the manual are included at the end of this booklet.

Q. I have heard that HBO and some other services may scramble. Will this render my backyard receiver obsolete?

A. No. HBO has announced that it intends to scramble its transmissions. Some other subscription services have said that they are also looking into the matter. Many observers are skeptical about HBO's plan. Even if HBO does scramble its transmissions, there are dozens of other services available on the satellite, such as those that are supported by voluntary contributions or are advertiser supported.

SPACE has already offered HBO and other pay satellite services a method for compensation. If HBO does scramble, SPACE will try to have HBO sell its descramblers to home satellite users or to have adequate laws passed to protect your viewing rights.

Q. What is Congress' position on private satellite earth station systems?

A. When Congress passed the Communications Act of 1934, it directed the FCC to encourage new technologies and services to grow as rapidly as possible. The purpose of the law was to provide all Americans with quality communication services at the lowest possible prices. SPACE believes the recent growth of private satellite terminals helps to meet these Congressional objectives. Recently, several Congressman have gone on record as strongly endorsing the goals of the satellite industry. These include Congressman Billy Tauzin (D-La.) and Congressman Charlie Rose (D-N.C.).

Congressman Henry Waxman, (D-Calif.) who represents the Hollywood area of California, and who is a leading proponent of increased penalties for theft of pay TV services, has referred to satellite earth stations as "fantastic devices" which are enabling rural Americans to have the same types of communication services that are available to their urban and suburban counterparts. The proceedings of the U.S. House of Representatives are now available for viewing by private earth stations through the satellite service known as C-SPAN. Through the efforts of SPACE, a growing number of U.S. Senators are also becoming aware of the benefits of this exciting technology. Senator Larry Pressler (R-S.D.) addressed SPACE's First Annual Convention and Exhibition in 1982. U.S. Senator Barry Goldwater (R-Ariz.), in recent Congressional hearings, twice announced that he was building his own satellite antenna.

Q. What is the "Brussels Satellite Convention?"

A. The "Brussels Satellite Convention", more formally known as the "Convention Relating to the Distribution of Program-Carrying Signals Transmitted by Satellites" is an international agreement which was signed in Brussels, Belgium, May 21, 1974. The terms of the Convention require those countries which have ratified it to take measures to prevent the reception of satellite programming by other than those for whom it is specifically intended. There is a specific exception in the Brussels agreement for signals which are intended for direct reception from a satellite by the general public. There are also some exceptions for reception of satellite programming for educational or scientific research purposes.

Originally, the agreement was urged by some of the major television networks. However, due to disputes among commercial television interests and educational and scientific organizations in the mid-1970s, the Convention was never submitted to the U.S. Senate for ratification. There have been some recent efforts to introduce this treaty in the Senate. Unless and until a two-thirds majority is obtained in the Senate, the Brussels Convention is not applicable in the United States.

7 About SPACE (Society for Private and Commercial Earth Stations)

Q. What can I do to safeguard my ability to view satellite programming or my economic stake in this business?

A. Join SPACE. SPACE (the Society for Private And Commercial Earth Stations) is the Washington, D.C.-based trade association representing the owners, distributors and manufacturers of backyard satellite earth stations and those in the private cable television business. Formed in 1980, SPACE has waged successful battles in front of Congress and the Federal Communications Commission. SPACE needs your support. If you are not already a member, join up! SPACE's address is 1920 N Street, N.W., Suite 510, Washington, D.C. 20036. Its telephone number is (202) 887-0605.

Q. What are the goals of SPACE?

A. Since its beginning early in 1980, the goals of SPACE have been: (1) to promote the interest of the public in direct satellite communications; (2) to defend the right of this industry to co-exist in the communications community; (3) to secure program viewing rights for users; (4) to liaison with the Federal Communications Commission, Congress and the White House; (5) to help ensure the industry's development; and (6) to monitor and counteract any harmful activity undertaken by those opposing the emergence of this program distribution system.

Q. What does SPACE do?

A. SPACE provides a wide variety of services for its members. Historically, its primary function has been to represent the interests of satellite earth station owners, manufacturers and distributors and those in the private cable television business before the Congress, the FCC and the Executive Branch. SPACE has been active, for example, in acquainting Congress with the many benefits of earth stations and leading the battle on four separate occasions to defeat legislation which could have harmed the interests of its members. In addition, SPACE has given legal assistance to individuals and associations around the country which have been threatened with adverse legal action. It has helped numerous members with their individual problems. It provides members with an informative monthly newsletter, SATVISION, and sponsors a yearly convention and exhibition, in addition to numerous seminars held at various locations throughout the country. It also provides numerous publications on various aspects of the earth station industry and offers discounts to members on various items, including Hertz rental cars.

Q. Who is SPACE?

A. SPACE's membership consists of thousands of individuals and companies which are engaged in one aspect or another of the satellite earth station business. The membership includes individual earth station owners who wish to be kept up-to-date on the legal and regulatory issues surrounding backyard satellite reception, as well as major New York Stock Exchange companies which are involved in manufacturing earth station equipment.

Q. What can SPACE do for me?

A. As a member of SPACE, you will receive a certificate of membership, regular newsletters and timely information on government activities and political action and discounts on books and information covering earth stations, and a discount on attendance at various SPACE functions. It is the only organization which will keep you up to date on Congressional action affecting the home reception of satellite programming. Lobbying efforts on current critical issues are coordinated on a nationwide basis by the SPACE staff.

SPACE acts as a clearinghouse for the problems of all its members and frequently provides information and assistance to those members encountering any problems with earth station installation and use.

Q. How can I join SPACE?

A. A membership application is contained in the front of this booklet. Simply follow the instructions and mail it to SPACES's offices.

SPACE INTRODUCES THREE NEW PUBLICATIONS

1.

EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT PRIVATE CABLE

(BUT DIDN'T KNOW WHO TO ASK...)

IS NOW AVAILABLE IN SPACE'S JUST-RELEASED SINGLE VOLUME *THE BUSINESS OF PRIVATE CABLE*

Private Cable is one of the fastest growing, most exciting segments of the earth station explosion. In response to the demand of the earth station community for information and insights into the private cable business, SPACE has organized a panel of experts to deliver a series of private cable seminars throughout the country. The backbone of these Seminars is the SPACE publication, *The Business of Private Cable,* which was first used at the SPACE Private Cable Seminar in January. The response to the book has been overwhelming:

John Grantham, President, National Microtech

"I thought the Private Cable Book was very concise and very well done. It covers all areas of the SMATV business, such as legal and financial profitability of the SMATV business.**

David P. Johnson, President, Paradigm

"The Private Cable Book is a necessity for anyone interested in going into the business of SMATV. The information contained in the book is vital to the success of any company wishing to take part in SMATV.

Art Kawai, TVRO Sales Manager, Dexcel, Inc.

"The Private Cable Book is an excellent source for any entrepreneur who needs details from beginning to end on how to start an SMATV business.

Mike Wade, President, Multi Cable Services, Inc.

"I wish I had this book three years ago...it's more than worth its weight in gold."

This 150-page comprehensive volume includes chapters on:

- Financing and Private Cable Pro Formas (an indispensable tool for getting into business...what every banker wants to see...what you need to assess profit potential).
- Sample Contracts (with real estate owners...all the important provisions to safeguard your investment).
- Copyright and FCC Licensing Procedures. (Are you exempt from regulations, how to fill out the copyright forms to carry the Super Stations; how to get a license for your earth station.)
- Legal Considerations
- Programming Sources
- Legislative Issues

Whether you are just becoming acquainted with the private cable business or are an existing private cable operator, SPACE's *The Business of Private Cable* will give you helpful insights, practical information and the low-down on the ins and outs of private cable operations.

2.

QUESTIONS ABOUT EARTH STATIONS? SPACE HAS THE ANSWERS

SPACE's *Question and Answer Book* is a basic outline of the earth station industry, featuring answers to the questions most frequently asked about earth station operations. It is a helpful guide geared to introduce earth station enthusiasts to the industry. Special volume discounts are available to SPACE Dealer, Manufacturer and Pioneer members, who may wish to use the booklet in promotional campaigns.

3.

IS YOUR LOCAL ZONING COMMISSION THREATENING TO EXILE EARTH STATIONS TO: *THE TWILIGHT ZONE?*

FACT: Most Zoning Commissions have no experience in dealing with the issues surrounding earth station installations.

FACT: Zoning Commissions may be getting all of their information about earth stations from your competitor, the local cable company.

FACT: Most Zoning Commissions are looking for guidance on the issues surrounding earth station installations. If you have information, they're usually willing to listen.

FACT: There is something you can do. The SPACE *Zoning Book* answers most zoning questions and covers the major zoning issues surrounding earth station installations. It contains sample ordinances and tips on how to fight restrictive regulations. The book is divided into chapters covering: the FCC; Basis for Zoning Restrictions; Preparation for a Hearing; Reasonable Zoning Laws and Model Zoning Ordinances.

PLUS

VIDEO TAPES OF SPACE'S PRIVATE CABLE SEMINAR

VHS and Beta format videotapes of Space's much acclaimed PRIVATE CABLE SEMINAR are now available. The tapes cover the presentations of all seminar speakers and provide comprehensive information on constructing, operating, financing, programming and the legal issues involved in private cable operations. Anyone interested in the private cable business will benefit from the wealth of information provided on the videotapes.

ORDER FORM

Order your SPACE publications by completing this form and mailing with the appropriate payment to:

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